LEVEL AND CONDITIONS OF GLOBAL MOTOR COORDINATION AND JUMPING ABILITIES AMONG POLISH AND GERMAN NATIONAL TEAM WATER-POLO PLAYERS

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Original scientific paper

Abstract
Water polo is considered a complex sport discipline as far as motor coordination is concerned. Players are required to have a high level of fitness and many coordination abilities. Among fitness abilities there are strength, velocity and endurance, which are the basics of tactical actions and techniques. A general overview of motor abilities requires considering different coordination abilities, which level and conditions have not been researched completely. The potential of coordination is manifested in every movement, and it determines players' possibilities assigning their present condition of fitness workout. Therefore, it is justified to undertake research of various aspects of motor coordination. The objective of the research was to determine the level and dependence of the selected coordination and jumping abilities among advanced water-polo players of different age groups: 11 cadets, 11 juniors, 13 seniors (Polish national team), 10 seniors (German champions). The authors used W. Starosta global coordination and jumping tests [1978a, 1978b, 2003, 2006] in order to establish the level of motor coordination and jumping abilities. On the basis of the gathered material it was observed that juniors had the highest level of the selected coordination and jumping abilities. There were no significant relationships between motor coordination and jumping abilities. Besides, it was established that there were no significant relationships among the results of motor coordination and jumping abilities and somatic indexes. Having tested motor coordination, it was proved that left turns are the dominant ones among the majority of water-polo players.

Key words: *coordination, jumping, tests, water polo, cadets, juniors, seniors, national teams*

Introduction

The high level of motor coordination abilities is conductive to success in sport team games. It also concerns water-polo – one of the games which action takes place in the "water field". The research results of G. Markiewicz and W. Starosta (1998) showed that exercises in water – including playing water-polo – is conductive to improvement of motor coordination abilities among players participating in team games. The water environment is unusual for basketball, volleyball or handball players, whereas water-polo competitors consider it as a natural one. Therefore, we may claim that water-polo players should be characterized with a high level of motor coordination. Success in this sport discipline is conditioned by well-thought-out tactical actions of the whole team and a high level of motor fitness of given players. However, effectiveness of individual actions depends - among other things - on high level of motor coordination and jumping abilities. The latter one means ability to raise ones body above the water surface. The rivalry of players in a different environment inspired researches to analyze various aspects of water-polo. However, there have only been few published theses which presented coordination abilities among water-polo players (Kos et al., 1997; Garbolewski et al., 1999). Therefore, a research began, which objectives were to: 1. Determine the level of coordination and jumping abilities among water-polo players; 2. Determine the correlation between motor coordination and jumping ability;

3. Establish the correlation among the level of motor coordination, jumping ability and the basic somatic indexes and the age.

Material and Methods

There were 45 advanced water-polo players of different age (Table 1) – 11 cadets (champions of National Youth Olympics), 11 juniors (Polish champions), 13 seniors (Polish national team), 10 seniors (German champions). The research was carried out during the preparatory period. In order to measure the level of global motor coordination and jumping ability, W. Starosta's tests (1978a, 1978b, 2003, 2006) was applied. From 8 task of global coordination test was selected only one: maximal turn in jump from both feet. This task was a middle level of complexity and has very high factor of reliability (0.94-0.99).

Table 1. Age, body weight and height of the water-polo players (average values– $\bar{x}$ and standard deviation - S) n=45

TEAM	n	Age (years)	Body weight (kg)	Body height (cm)
Cadets	11	15.5 ± 0.5	70.7 ± 8.5	178.4 ± 6.5
Juniors	11	17.5 ± 0.6	76.1 ± 11.4	181.4 ± 5.4
Seniors – national team	13	22.2 ± 2.6	83.7 ± 6.9	187.2 ± 6.6
Seniors – German team	10	27.1 ± 2.3	87.2 ± 7.4	189.5 ± 3.7

The test is characterized by objectivity, accuracy (exact to 1 degree), simplicity of measurement and universal character of the motor tasks measured (movement symmetry when performing it 3 time with turn in the right and left side).

Result in test is registered of the coordination-meter which is a wooden platform (1 m^2) with a black – painted ring (diameter 80 cm) and with the contour of feet in the center. The circumference of the ring is countered by 2 angle scale for the left and right turn reading, respectively (Starosta, 2003, 2006). The gathered material was analyzed statistically.

Results

Level of coordination and jumping abilities

The highest level of motor coordination (The expressions of coordination abilities and motor coordination are used interchangeability) was observed among juniors and the lowest was among seniors from Germany (table 2). Significant statistical differences were between cadets and junior teams (r=0.59; p<0.01) and national team of seniors (r= -0.43; p<0.05). The research also revealed that the movements were diversified according to the body side of the player which is involved in the performance of tasks, i.e. right and left turns. The value of correlation factor between right and left turns is statistically significant among seniors of Polish national team (r=0.84) and team from Germany (r=0.75), which favored the left turn more than the right one. There was an unimportant statistical relationship in cadet and junior teams, among which cadets had better results performing left turns; however, right turns slightly dominated among juniors. The smaller values of the correlation factor between directions of the turns among the juniors showed that the players with a high potential of motor coordination revealed a bigger symmetry of movement.

Table 2. Level and dependence of motor coordination and jumping abilities (n=45)

Team	Motor coordination										Jumping abilities			r
	Turns in right			Turns in left			R	Total of turns in right and left						
	$\bar{x}$	S	V	$\bar{x}$	S	V		$\bar{x}$	S	V	$\bar{x}$	S	V	
C	332.4	62.5	19.4	337.9	65.0	19.2	0.56	660.3	112.6	17.1	55.7	5.51	9.9	0.31
J	351.6	20.7	5.9	349.2	39.2	11.2	0.44	700.8	51.7	7.4	56.8	6.81	11.9	0.34
SntP	321.2	34.2	10.6	336.5	26.6	7.9	0.84*	657.6	58.4	8.9	54.5	5.64	10.3	-0.08
SGt	308.2	25.4	8.2	313.4	33.8	10.8	0.75*	621.6	55.4	8.9	52.9	4.01	7.6	0.33

*p< 0,01, Teams: C- cadets; J- juniors; SnkP-seniors national team Poland; SGt-seniors, German team

A similar tendency was noticed with regard to the jumping abilities. The highest values were observed among juniors (x =56.8 cm), and the smallest ones were among German players (x =52.9 cm). Within the limits of this ability, there were statistically significant differences between the cadets team and senior groups – Polish national team (r=0.64; p<0.01) and German team (r= -0.48; p<0.05).

Correlation between the level of motor coordination and jumping ability

The analysis of results showed that there were positive little correlation among German juniors (r=0.34), seniors (r=0.33) and cadets (r=0.31).

Correlation between motor coordination, jumping abilities and the basic somatic indexes

It was noticed that there was a moderate correlation between the age (r= -0.49), body height (r=0.32) and weight (r=0.24) among juniors within the scope of motor coordination. There was no significant relationship among other players from different teams. Similar correlation was established with regard to the jumping abilities. The strongest and the most numerous relationships were noticed among juniors with regard to the age (r=-0.57), body weight (r=0.57) and height (r=0.36). The only significant relationship connected with the age was observed among seniors from the Polish national team (r=0.64, p<0.05).

Discussion and conclusions

The conducted research proved that there was a higher level of motor coordination and jumping abilities among younger water-polo players then among seniors. It seems that the process of growing older reflects the lower level of examined abilities as a result of a long-term training. This phenomenon is caused by reducing the number of the new and complex coordination exercises. The presented results may represent a comparative material for other team games, due to the choice of the applied tests. However, the conclusion needs to be interpreted cautiously, because the conducted research may not reflect the level of the tested abilities in the conditions similar to the specificity of water-polo. The lack of ground during a game may influence the research results, and a similar research – however, the one which is carried out on the ground may be different. Therefore, a further research, which will continue the stated objectives, should be conducted in a typical environment for water-polo, i.e. in water.

Conclusions:

1. The highest level of the selected coordination and jumping abilities was observed among juniors and the lowest level among German seniors.
2. Insignificant relationships were observed between motor coordination and jumping abilities.
3. The highest correlation factors were among coordination, jumping abilities and somatic indexes, which were characteristic for juniors.

Having tested motor coordination, it was proved that left turns are the dominant ones among the majority of water-polo players.

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RAZINA I UVJETI GLOBALNE MOTORIČKE KOORDINACIJE I SPOSOBNOSTI SKOKA MEĐU POLJSKIM I NJEMAČKIM REPREZENTATIVNIM VATERPOLISTIMA

Sažetak

Za vaterpolo se pretpostavlja da je kompleksna sportska disciplina u smislu motoričke koordinacije. Od igrača se zahtijeva da posjeduju visoku razinu fitnesa i mnogo koordinacijskih sposobnosti. Među sposobnostima fitnesa su snaga, brzina i izdržljivost, što je temelj taktičkih akcija i tehnike. Opći pregled motoričkih sposobnosti zahtijeva uvažavanje različitih koordinacijskih dimenzija, čija razina i uvjeti iskazivanja nisu potpuno istraženi. Koordinacijski potencijal se iskazuje u svakom pokretu i određuje igračeve mogučnosti pridruživanja postojećih uvjeta izlaznim stanjima fitnesa. Dakle, treba uvažiti istraživanja različitih aspekata motoričke koordinacije. Predmet istraživanja je utvrđivanje razine i ovisnosti izabranih koordinacijskih skakačkih sposobnosti među naprednim vaterpolistima različitih uzrasnih skupina: 11 kadeta, 11 juniora, 13 seniora (Poljska nacionalna vrsta), 10 seniora (Njemačka nacionalna vrsta). Autori su koristili globalni koordinacijski i skakački test (Starosta, 1978a; 1978b; 2003; 2006) s ciljem utvrđivanja razine koordinacijskih i skakaćkih sposobnosti. Temeljem prikupljenog materijala primjećeno je da junior imaju najveću razinu izabranih koordinacijskih i skakačkih sposobnosti. Nije bilo značajnih relacija između motoričke koordinacije i skakačkih sposobnosti. Usto, utvrđeno je da nema značajnih relacija između tih sposobnosti i tjelesnih indeksa. Testiranje motoričke koordinacije dokazalo je da je lijevi okret dominantno gibanje među vaterpolistima.

Ključne riječi: *koordinacija, skakanje, testovi, vaterpolo, kadeti, juniori, seniori, nacionalne vrste*

Received: April 9, 2013
Accepted: December 10, 2013
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